PB-246 660

IMPLEMENTATION PLAN REVIEW FOR MICHIGAN REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

Argonne National Laboratory

Prepared for:

Environmental Protection Agency

February 1975

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE

325006

PB 246 660

EPA-450/3-75-003

FEBRUARY 1975

IMPLEMENTATION PLAN REVIEW FOR MICHIGAN AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

U. S. ENVIRONMENTAL PROTECTION AGENCY

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

58

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-450/3-75-003		PB 246 600

4. TITLE AND SUBTITLE	5. REPORT DATE
IMPLEMENTATION PLAN REVIEW FOR MICHIGAN REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT	February 1975
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, N.C., Region V Office, Chicago, Ill., and Argonne National Laboratory, Argonne, Ill.	10. PROGRAM ELEMENT NO.
	11. CONTRACT/GRANT NO. EPA-IAG-D5-0463
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Air and Waste Management Office of Air Quality Planning and Standards Research Triangle Park, N.C. 27711	13. TYPE OF REPORT AND PERIOD COVERED
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

Section IV of the Energy Supply and Environmental Coordination Act of 1974, (ESECA) requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the national ambient air quality standards. This document, which is also required by Section IV of ESECA, is EPA's report to the State indicating where regulations might be revised.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air pollution State Implementation Plans	PRICES SUBJECT TO CHANGE	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release unlimited	Unclassified	58
	20. SECURITY CLASS *(This page)*	22. PRICE
	Unclassified	$4.50-2.25

EPA Form 2220-1 (9-73)

/.

EPA-450/3-75-003

IMPLEMENTATION PLAN REVIEW

FOR

MICHIGAN

REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

PREPARED BY THE FOLLOWING TASK FORCE:

U.S. Environmental Protection Agency, Region V
230 S. Dearborn
Chicago, Illinois 60604

Energy and Environmental Systems Division
Argonne National Laboratory
Argonne, Illinois 60439
(EPA-IAG-D5-0463)

U.S. Environmental Protection Agency
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

February 1975

MICHIGAN

ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT
SECTION IV - STATE IMPLEMENTATION PLAN REVIEW

Table of Contents

		Page
1.0	EXECUTIVE SUMMARY	5
2.0	MICHIGAN STATE IMPLEMENTATION PLAN	11
2.1	Summary	11
2.2	Air Quality Setting for the State of Michigan	12
2.3	Background on the Development of the Current State Implementation Plan	17
2.4	Special Considerations for the State of Michigan	18
3.0	AIR QUALITY CONTROL REGION ASSESSMENTS	20
3.1	General Methodology	20
3.2	South Bend-Elkhart-Benton Harbor Interstate AQCR (#82)	22
3.3	Central Michigan Intrastate AQCR (#122)	22
3.4	Metropolitan Detroit-Port Huron Intrastate AQCR (#123)	23
3.5	Metropolitan Toledo Interstate AQCR (#124)	24
3.6	South Central Michigan Intrastate AQCR (#125)	24
3.7	Upper Michigan Intrastate AQCR (#126)	25
TECHNICAL APPENDICES		
APPENDIX A	State Implementation Plan Background	27
APPENDIX B	Regional Air Quality Assessment	39
APPENDIX C	Power Plant Assessment	41
APPENDIX D	Industrial, Commercial, Institutional Point Source Assessment	47
APPENDIX E	Area Source Assessment	51
APPENDIX F	Fuels Assessment	53
REFERENCES		55

STATE IMPLEMENTATION PLAN REVIEW
FOR
THE STATE OF MICHIGAN

1.0 EXECUTIVE SUMMARY

The enclosed report is the U.S. Environmental Protection Agency's (EPA's) response to Section IV of the Energy Supply and Environmental Coordination Act of 1974 (ESECA). Section IV requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). In addition to requiring that EPA report to the state on whether control regulations might be revised, ESECA provides that EPA must approve or disapprove any revised regulations relating to fuel burning stationary sources within three months after they are submitted to EPA by the states. The states may, as in the Clean Air Act of 1970, initiate State Implementation Plan revisions; ESECA does not, however, require states to change any existing plan.

Congress has intended that this report provide the state with information on excessively restrictive control regulations. The intent of ESECA is that SIPs, wherever possible, be revised in the interest of conserving low sulfur fuels or converting sources which burn oil or natural gas to coal. EPA's objective in carrying out the SIP reviews, therefore, has been to try to establish if emissions from combustion sources may be increased. Where an indication can be found that emissions from certain fuel burning sources can be increased and still attain and maintain NAAQS, it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with both environmental and national energy needs.

In many respects, the ESECA SIP reviews parallel EPA's policy on clean fuels. The Clean Fuels Policy has consisted of reviewing implementation plans with regard to saving low sulfur fuels and, where the primary sulfur dioxide air quality standards were not exceeded, to encourage states to either defer compliance with regulations or to revise the SO_2 emission regulations. The states have also been asked to discourage large-scale shifts from coal

to oil where this could be done without jeopardizing the attainment and maintenance of the NAAQS.

To date, EPA's fuels policy has addressed only those states with the largest clean fuels saving potential. Several of these states have or are currently in the process of revising SO_2 regulations. These states are generally in the eastern half of the United States. ESECA, however, extends the analysis of potentially over-restrictive regulations to all 55 states and territories. In addition, the current reviews address the attainment and maintenance of all the National Ambient Air Quality Standards.

There are, in general, three predominant reasons for the existence of overly restrictive emission limitations within the State Implementation Plans. These are: 1) the use of the example region approach in developing statewide air quality control strategies; 2) the existence of State Air Quality Standards which are more stringent than NAAQS; and 3) the "hot spots" in only part of an Air Quality Control Region (AQCR) which have been used as the basis for controlling the entire region. Since each of these situations affects many state plans and in some instances conflicts with current national energy concerns, a review of the State Implementation Plans is a logical follow-up to EPA's initial appraisal of the SIPs conducted in 1972. At that time SIPs were approved by EPA if they demonstrated the attainment of NAAQS or more stringent state air quality standards. Also, at that time an acceptable method for formulating control strategies was the use of an example region for demonstrating the attainment of the standards.

The example region concept permitted a state to identify the most polluted air quality control region (AQCR) and adopt control regulations which would be adequate to attain the NAAQS in that region. In using an example region, it was assumed that NAAQS would be attained in the other AQCRs of the state if the control regulations were applied to similar sources. The problem with the use of an example region is that it can result in excessive controls, especially in the utilization of clean fuels, for areas of the state where sources would not otherwise contribute to NAAQS violations. For example, a control strategy based on a particular region or source can result in a regulation requiring 1 percent sulfur oil to be burned statewide where the use of 3 percent sulfur coal would be adequate to attain NAAQS in some locations.

EPA anticipates that a number of states will use the review findings to assist them in deciding whether or not to revise portions of their State Implementation Plans. However, it is most important for those states which desire to submit a revised plan to recognize the review's limitations. The findings of this report are by no means conclusive and are neither intended nor adequate to be the sole basis for SIP revisions; they do, however, represent EPA's best judgment and effort in complying with the ESECA requirements. The time and resources which EPA has had to prepare the reports has not permitted the consideration of growth, economics, and control strategy tradeoffs. Also, there has been only limited dispersion modeling data available by which to address individual point source emissions. Where the modeling data for specific sources were found, however, they were used in the analysis.

The data upon which the report's findings are based is the most currently available to the federal government. However, EPA believes that the states possess the best information for developing revised plans. The states have the most up-to-date air quality and emissions data, a better feel for growth, and the fullest understanding for the complex problems facing them in the attainment and maintenance of quality air. Therefore, those states desiring to revise a plan are encouraged to verify and, in many instances, expand the modeling and monitoring data supporting EPA's findings. In developing a suitable plan, it is suggested that states select control strategies which place emissions for fuel combustion sources into perspective with all sources of emissions such as smelters or other industrial processes. States are encouraged to consider the overall impact which the potential relaxation of overly restrictive emissions regulations for combustion sources might have on their future control programs. This may include air quality maintenance, prevention of significant deterioration, increased TSP, NO_x, and HC emissions which occur in fuel switching, and other potential air pollution situations such as sulfates.

Although the enclosed analysis has attempted to address the attainment of all the NAAQS, most of the review has focused on total suspended particulate matter (TSP) and sulfur dioxide (SO_2) emissions. This is because stationary fuel combustion sources constitute the greatest source of SO_2 emissions and are a major source of TSP emissions.

Part of each state's review was organized to provide an analysis of the SO_2 and TSP emission tolerances within each of the various AQCRs. The regional emission tolerance estimate is, in many cases, EPA's only measure of the "over-cleaning" accomplished by a SIP. The tolerance assessments have been combined with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for changing emission limitation regulations. In conjunction with the regional analysis, a summary of the state's fuel combustion sources (power plants, industrial sources, and area sources) has also been carried out.

The following are the principal findings for the state of Michigan. (Air Quality Control Regions are displayed on Fig. 1-1.)

- The federal National Ambient Air Quality Standards for total suspended particulates and sulfur oxides apply in Michigan.
- Michigan's statewide emission regulations for particulate matter and sulfur dioxide were based on a modified example region approach. Rollback on the "hot spots" was used in parts of all six Michigan AQCRs.
- Within the framework of this review, there are indications of little tolerance for increased particulate emissions throughout the state due to either high TSP levels (based on 1973 data) or TSP levels which are just meeting the standards. There appears to be a sufficient number of particulate air quality monitoring sites to support this conclusion. Modeling data for particulates is lacking.
- The final sulfur regulations for the state of Michigan to be met by mid-1978 are more restrictive than those which are to be met by mid-1975. The more restrictive 1978 limits were designed to insure compliance with annual and 24-hour secondary NAAQS which were rescinded by EPA and which were more restrictive than the present NAAQS. The less restrictive 1975 limits were designed to meet present SO_2 NAAQS.
- Under the State Implementation Plan, the Michigan Air Pollution Control Commission has the authority to delay compliance with sulfur dioxide emission regulations until January 1, 1980 and beyond for specific fuel combustion sources provided that such sources are not subject to federal New Source Performance Standards and can demonstrate that they do not create or contribute to a violation of National Ambient Air Quality Standards. This provision has been used to allow the use of high sulfur coals by various fuel combustion sources and the potential clean fuels savings from sources to which the delayed compliance provision does not apply is small.

Figure 1-1. Michigan Air Quality Control Regions (AQCR)

- Under the delayed compliance provision and EPA's Clean Fuels Policy, Michigan has recently submitted revisions of its State Implementation Plan requesting compliance extensions until 1980 for six large coal-fired power plants. EPA has approved revisions for three of these plants. The state and EPA Region V are currently evaluating the revisions for the other three plants.

- Given the extensive use that the State of Michigan has made of the delayed compliance provision, there is little reason for the state to consider regulation relaxation between now and January 1, 1980, since a mechanism already exists to allow the use of higher sulfur fuels.

- The majority of power plants and industrial/commercial/institutional sources in Michigan burn coal. The major impact of compliance extensions has been to conserve lower sulfur coals.

2.0 MICHIGAN STATE IMPLEMENTATION PLAN REVIEW

2.1 Summary

A revision of fuel combustion source emissions regulations will depend on many factors. For example:

- Does the state have air quality standards which are more stringent than NAAQS?
- Does the state have emission limitation regulations for control of (1) power plants, (2) industrial sources, (3) area sources?
- Did the state use an example region approach for demonstrating the attainment of NAAQS or more stringent state standards?
- Has the state not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?
- Are there no proposed Air Quality Maintenance Areas?
- Are there indications of a sufficient number of monitoring sites within a region?
- Is there an expected 1975 attainment date for NAAQS?
- Based on (1973) air quality data, are there no reported violations of NAAQS?
- Based on (1973) air quality data, are there indications of a tolerance for increasing emissions?
- Are the total emissions from stationary fuel combustion sources a relatively small portion of the regional total?
- Do modeling results for specific fuel combustion sources show a potential for a regulation revision?
- Is there a significant clean fuels savings potential in the region?

The following portion of this report is directed at answering these questions. An AQCR's potential for revising regulations increases when there are affirmative responses to the above.

The initial part of the SIP review report, Section 2 and Appendix A, is organized to provide the background and current situation information

for the State Implementation Plan; Section 3, and the remaining Appendices provide an analysis by AQCR which helps establish the overall potential for revising regulations. An evaluation of regional air quality indicators is presented in Appendix B; power plants, industrial sources, and area sources are analyzed in Appendices C, D, and E, respectively.

Based on an overall evaluation of EPA's current information, AQCRs have been classified as good, marginal, or poor candidates for regulation revisions. Table 2-1 summarizes the State Implementation Plan Review. The remaining portions of the report support this summary with explanations.

2.2 Air Quality Setting for the State of Michigan

2.2.1 Michigan Air Pollution Control Areas

The state of Michigan is divided into six Air Quality Control Regions (AQCRs) as shown in Fig. 1-1. There are four intrastate and two interstate regions. There is only one county in the Michigan portion of the Metropolitan Toledo AQCR (#124). Table A-1 lists the pollutant priority classifications for each of these six regions.

The table also shows the population density to be largest in the Metropolitan Detroit-Port Huron AQCR (#123) and the Metropolitan Toledo AQCR (#124) with the former having a substantially greater population density. Based on present conditions and growth projections, three counties in the Metropolitan Detroit-Port Huron AQCR (#123) have been proposed as Air Quality Maintenance Areas (AQMAs) for particulates. These counties are indicated in Table A-1 and Fig. A-1. Public hearings are to be held late in January, 1975 concerning the possible designation of other AQMAs in Michigan.

2.2.2 Michigan Ambient Air Quality Standards

As shown in Table A-2, all the federal primary and secondary National Ambient Air Quality Standards (NAAQS) for total suspended particulates, sulfur oxides and nitrogen dioxide apply in Michigan. The following analysis addresses the attainment of these standards.

Table 2-1. State Implementation Plan Review for Michigan

"INDICATORS"	State		South Bend-Elkhart-Benton Harbor[a] AQCR #82		Central Michigan AQCR #122		Metropolitan Detroit-Port Huron AQCR #123		Metropolitan Toledo[a] AQCR #124	
	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2
• Does the State have air quality standards which are more stringent than NAAQS?	No	No[b]								
• Does the State have emission limiting regulations for control of: 1. Power plants 2. Industrial sources 3. Area sources	Yes Yes Yes	Yes Yes Yes								
• Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?	No[d]	No[d]								
• Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?	Yes	No[e]								
• Are there no proposed Air Quality Maintenance Areas?			Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
• Are there indications of a sufficient number of monitoring sites within a region?			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• Is there an expected 1975 attainment date for NAAQS?			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• Based on (1973) Air Quality Data, are there no reported violations of NAAQS?			No	Yes	No	No	No	No	No	Yes
• Based on (1973) Air Quality Data, are there indications of a significant tolerance for increasing emissions?			No	Yes	No	No	No	No	No	Yes
• Are the emissions from stationary fuel combustion sources a relatively small portion of the regional total?			Yes	Yes	No	No	No	No	Yes	Yes
• Do modeling results for specific fuel combustion sources show a potential for a regulation revision?			NA[f]	NA[f]	NA	No	NA	NA	NA	No
• Is there a significant Clean Fuels Saving potential in the region?			No		No		No		No	
• Must the regulations be revised to accomplish significant fuel switching?			No		No		No		No	
• Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations? h			TSP - Poor SO_2 - Poor		TSP - Poor SO_2 - Poor		TSP - Poor SO_2 - Poor		TSP - Poor SO_2 - Poor	

Reproduced from best available copy.

Table 2-1. State Implementation Plan Review for Michigan (Contd.)

"INDICATORS"	South Central Michigan AQCR #125 TSP	South Central Michigan AQCR #125 SO_2	Upper Michigan AQCR #126 TSP	Upper Michigan AQCR #126 SO_2
• Does the State have air quality standards which are more stringent than NAAQS?				
• Does the State have emission limiting regulations for control of: 1. Power plants 2. Industrial sources 3. Area sources				
• Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?				
• Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?				
• Are there no proposed Air Quality Maintenance Areas?	Yes	Yes	Yes	Yes
• Are there indications of a sufficient number of monitoring sites within a region?	Yes	No	Yes	Yes
• Is there an expected 1975 attainment date for NAAQS?	Yes	Yes	No[g]	Yes
• Based on (1973) Air Quality Data, are there no reported violations of NAAQS?	Yes	No	No	Yes
• Based on (1973) Air Quality Data, are there indications of a significant tolerance for increasing emissions?	No	No	No	Yes
• Are the emissions from stationary fuel combustion sources a relatively small portion of the regional total?	No	No	Yes	No
• Do modeling results for specific fuel combustion sources show a potential for a regulation revision?	NA	No	NA	No
• Is there a significant Clean Fuels Saving potential in the region?	No		No	
• Must the regulations be revised to accomplish significant fuel switching?	No		No	
• Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations?	TSP - Marginal SO_2 - Poor		TSP - Poor SO_2 - Poor	

Table 2-1. State Implementation Plan Review for Michigan (Contd.)
Footnotes

[a]Interstate.

[b]Michigan has air quality goals, not standards, more stringent than NAAQS, that apply in the Michigan-Ontario Transboundary area of the Metropolitan Detroit-Port Huron AQCR #123.

[c]Except for residential units outside Wayne County.

[d]Rollback was used to demonstrate the sufficiency of the regulations in counties comprising all or part of each AQCR.

[e]The delayed compliance provision of Michigan's SO_2 regulation has been used extensively to allow the use of high sulfur coals on a source-by-source basis. Wayne County is presently evaluating the need to implement the last step of its sulfur regulation.

[f]No power plants.

[g]Attainment schedule indicates region is below standards; current data indicates violations.

[h]Good - Air quality indicators show a tolerance to absorb increased emissions and source-by-source evaluations show a significant clean fuels savings potential.

Poor - Air quality indicators show little or no tolerance for increased emissions and/or source evaluations indicate little or no clean fuels savings potential.

Marginal - Air quality and clean fuels savings evaluations are inconclusive or conflicting. More detailed analysis needed.

2.2.3 Michigan Air Quality Status

The current air quality status in Michigan is summarized in Table A-3 and Table A-4 for particulates and sulfur dioxide, respectively. All data come from the SAROAD data bank as of June, 1974.

With the exception of South Central Michigan (#125), all AQCRs partly or wholly in the state of Michigan show violations of the particulate standards. There are also indications of a sufficient number of monitoring sites in all AQCRs. The severest particulate problems occur in Central Michigan (#122) and Metropolitan Detroit-Port Huron (#123) for both of which there are indications that large overall emissions reductions are required to meet secondary particulate NAAQS. In Metropolitan Detroit-Port Huron (#123), this assessment is consistent with the proposal of particulate AQMAs. Although present air quality is acceptable, there are indications that South Central Michigan (#125) has little capacity to absorb increased particulate emissions. Thus, with the possible exception of South Central Michigan (#125) there are regional indications that particulate emission regulation relaxation is not possible.

High SO_2 levels are reported in Central Michigan (#122), Metropolitan Detroit-Port Huron (#123), and South Central Michigan (#125). In each of these regions, only one station is reporting the high levels but South Central Michigan has only four stations. The SO_2 problem is most severe in Central Michigan (#122) and the violation in Metropolitan Detroit-Port Huron (#123) is only slightly above standard. There are indications based on regional air quality in South Bend-Elkhart-Benton Harbor (#82), Metropolitan Toledo (#124), and Upper Michigan (#126) that a substantial capacity to absorb increased SO_2 emissions exists.

2.2.4 Michigan Emissions Summary

Emission sources and emission rates are tabulated in Tables A-5 to A-7.

In the six AQCR area, Michigan fuel combustion sources account for about 55% of the particulate and about 81% of the SO_2 emissions. Michigan fuel combustion sources contribute more than half the particulate emissions in South Bend-Elkhart-Benton Harbor (#82), Central Michigan (#122) and South Central Michigan (#125). Table A-6 shows that the major contributor

to Michigan particulate emissions from fuel combustion among electricity generation, industrial/commercial/institutional point sources, and area sources varies from AQCR to AQCR. In South Central Michigan (#125), the only region not showing particulate air quality violations, industrial/commercial/institutional point sources and area sources emit significantly more particulate than does electricity generation.

In all AQCRs except South Bend-Elkhart-Benton Harbor (#82) and Metropolitan Toledo (#124), the SO_2 emissions from Michigan fuel combustion sources constitute a relatively large fraction of the regional total implying that any SO_2 emission regulation relaxation would have a significant impact on air quality. Electricity generation emits a large amount of SO_2 in the other four regions as do industrial/commercial/institutional point sources in all four except Metropolitan Detroit-Port Huron (#123).

2.3 Background on the Development of the Current State Implementation Plan

2.3.1 General Information

Instead of using the example region approach, Michigan used rollback in counties comprising all or part of all six AQCRs. The counties examined in each region represented the areas with the highest measured or calculated pollutant levels. Although this approach is not strictly the example region approach it has the same result of possibly requiring restrictive regulations in regions or parts of regions where less restrictive regulations might suffice to attain and maintain NAAQS.

2.3.2 Particulate Control Strategy

The control strategy for fuel combustion sources consists of the enforcement of the applicable sections of the General Rules of the Michigan Department of Natural Resources Air Pollution Control Commission throughout the state except in Wayne County and, in Wayne County, of the enforcement of the applicable sections of the Air Pollution Control Regulation of the Wayne Department of Health. These regulations are summarized in Table A-9 and Fig. A-2. For particulate matter, the regulations were designed to meet both the primary and secondary particulate NAAQS within ten percent,

the accuracy associated with the proportional rollback model. The rollback for the 24-hour particulate standards was based on the maximum valid 24-hour value in each county treated.

2.3.3 Sulfur Dioxide Control Strategy

The regulations for SO_2 emissions are also summarized in Table A-9. Michigan presented two control strategies. Control Strategy I set emission limits to be met by mid-1975 and was designed to attain all the primary and the 3-hour secondary SO_2 NAAQS throughout the state. Control Strategy II set emission limits to be met by mid-1978 and was designed to attain the original annual and 24-hour secondary SO_2 NAAQS, which have since been rescinded by EPA, throughout the state with the exception of the 24-hour standard in Macomb County. Consideration of the meteorological conditions under which violations occurred in Macomb County indicated that the problem would abate as sources outside the county were controlled. The SIP also indicated that the EPA-rescinded secondary standards would be met in most areas in mid-1975. Since it was unknown how many sources might meet the Control Strategy II requirements by 1975, and since most would eventually have to do so, this analysis assumes that the final compliance regulations apply in 1975.

If a fuel combustion source is not subject to federal New Source Performance Standards and if it can be shown that it is not contributing to or causing a violation of the NAAQS, the Michigan regulation provides that the Commission may delay the compliance date for that source until January 1, 1980. This delayed compliance provision has been used extensively in Michigan to allow the continued use of high sulfur coals.

2.4 Special Considerations for the State of Michigan

2.4.1 Planned SIP Revisions

Under EPA's Clean Fuels Policy, the state of Michigan has submitted SIP revisions granting until 1980 for compliance with sulfur dioxide emission standards for six large coal-fired power plants. EPA has approved the plan revisions for three plants and the other three are currently undergoing further evaluation by the state and EPA Region V. Michigan has also made

extensive use of the delayed compliance provision of its SO_2 regulation to allow the use of higher sulfur coals by various fuel combustion sources throughout the state.

Wayne County is currently evaluating the need to implement the last step of its sulfur regulation for fuel combustion sources.

2.4.2 Fuels

Michigan is not a coal producer but is a large coal consumer. Over 80% of the heat input for power plants and industrial/commercial/institutional point sources comes from coal. Area sources consume primarily natural gas. Therefore, the major impact of regulation relaxation or delayed compliance in Michigan would be increased use of higher sulfur coals.

2.4.3 Fuel Conversions

The Federal Energy Administration[6] has identified the River Rouge and St. Clair power plants in Metropolitan Detroit-Port Huron (#123) as having the potential to switch from oil to coal.

3.0 AIR QUALITY CONTROL REGION ASSESSMENTS

3.1 General Methodology

The previous section having set the background for the State Implementation Plan and evaluated the current air-quality situation, this section will review the available information for each AQCR to determine the feasibility of relaxing emission regulations in the interest of conserving clean fuels. Care must be taken in interpreting the results of this analysis and the following caveats must be kept in mind. (1) The analytical procedure is intended to provide a first approximation to the evaluation of potential regulation changes (e.g. rollback and single source modeling techniques were used). The state must conduct a more detailed analysis of the situation to confirm or dispute any of these findings prior to submitting any SIP revisions. (2) In many instances the necessary data were unavailable or limited in scope. Where possible, best engineering estimates were used to fill in the gaps. Where better information is available, the state should use it in developing SIP revisions.

The analysis encompasses five distinct considerations for each AQCR. First, the current air quality situation is assessed to determine if the indicators point to the region's ability to tolerate an emission increase without violation of any NAAQS. Most of the data necessary for this review have already been presented in Sec. 2, and Tables B-1 and B-2 summarize the information for particulates and SO_2, respectively, in each AQCR. The assessment is made on the basis of 7 criteria: (1) current air quality violations, (2) expected NAAQS attainment dates, (3) proposed Air Quality Maintenance Area designations, (4) total emissions, (5) portion of emissions from the state's fuel combustion sources, (6) regional emission reduction required (based on rollback calculations), and (7) pollutant priority classification. Note that this evaluation is based strictly on air quality considerations. Determinations of whether regulation relaxation would, in fact, result in clean fuels savings will be made on a source-by-source evaluation.

The second consideration for each AQCR is the power plant assessment, and this data is summarized on the tables in Appendix C. All existing and proposed plants are reviewed to determine the clean fuel requirements imposed by existing regulations. Where dispersion modeling data are available, the

maximum allowable fuel sulfur content that would enable the plant to meet the NAAQS in its immediate vicinity is determined and compared to that required by existing regulations. For the purposes of this report, the SO_2 modeling data used[1] assumes that the power plant fuel use pattern in 1975 will be the same as that existing in 1971 with the addition of fuel consumption for new units coming on-line. The choice of 1971 as the baseline year is based on the consideration that fuel switching to achieve SIP emission regulations did not begin nationwide until 1972; therefore 1971 represents consumption patterns that are not dictated by emission regulations but rather by the economics of fuel availability. In terms of the maximum allowable fuel sulfur content determined from the modeling, the 1971 fuel sulfur content is used as an upper bound. No particulate modeling results were available. Fuel use data[2,3] and emission data[4,5] are drawn from both published and unpublished sources.

The third consideration for each AQCR is the assessment of large industrial/commercial/institutional point sources, and the summary data is presented in Appendix D. The procedure is effectively equivalent to that carried out for power plants in that the sulfur contents of fuels allowed under existing regulations are determined along with total clean fuels requirements. Fuel use data were drawn from the National Emission Data System (NEDS) file.[5] No individual source modeling data were available.

The fourth consideration is area source assessment. The fuel use patterns for these sources are taken from NEDS data.[5] The results are summarized in Appendix E.

The fifth consideration is a synthesis of the first four. Fuel use requirements for power plants and industrial/commercial/institutional point sources are aggregated by region and for the entire state. Estimates of potential clean fuels savings are made where modeling data exists. The summary table appears in Appendix F.

At this point, an overall assessment of the potential for regulation revision and resulting clean fuel savings can be made. The findings for each AQCR have been summarized on Table 2-1 and in Sec. 1. An AQCR is determined to be a good candidate for emission limit regulation revision if the air quality indicators show that the region has a tolerance to absorb increased emissions and if the source-by-source evaluations show that significant

clean fuels savings could be effected by such revision. If the air quality situation is such that no emission increase could be tolerated and/or if the source evaluations show little or no clean fuels savings potential, then the region is classified as a poor candidate for regulation revision. If the air quality or the clean fuels savings evaluations are inconclusive or show conflicting information, then the region is assessed as a marginal candidate for regulation revision. A much more detailed analysis must be carried out by the state to resolve the situation.

3.2 South Bend-Elkhart-Benton Harbor Interstate AQCR (#82)

Indications of high particulate levels (see Tables A-3 and B-1) and the small fuel consumption in the Michigan portion of this region (see Tables C-2, and D-2) make it a poor candidate for particulate emission regulation relaxation, since only a minimal clean fuel saving would result even if the regulations were relaxed.

Although regional air quality data indicate a substantial capacity to absorb increased SO_2 emissions (see Tables A-4 and B-2), the small fuel consumption and the consequent small clean fuels savings potential also make this region a poor candidate for SO_2 emission regulation relaxation. Present Michigan regulations do not regulate small area sources. Thus, higher sulfur fuels could be used by these sources if available (see Table E-1).

3.3 Central Michigan Intrastate AQCR (#122)

There are indications of existing widespread high TSP levels in this region (see Tables A-3 and B-1). Emissions from fuel combustion sources also contribute a relatively large fraction of the region's total particulate emissions (see Tables A-5 and A-6) implying that any increase in emissions would have a significant impact upon air quality. Thus, the region is a poor candidate for particulate emission regulation relaxation.

High SO_2 levels have been found in this AQCR (see Tables A-4 and B-2) and based on regional indicators, there appears to be little capacity to absorb increased SO_2 emissions (see Tables A-5 and B-2). Michigan has used the delayed compliance provision of its SO_2 emission regulation to allow the use of higher sulfur coals by fuel combustion sources in this region (see

Table C-1). This provision could also be used for most other combustion sources through January 1, 1980 and regulation revision is thus not necessary to allow the use of higher sulfur fuels. Sulfur emissions from small area sources are not regulated in Michigan and some small amounts of higher sulfur fuels, if available, could be used by these small sources (see Table E-1).

3.4 Metropolitan Detroit-Port Huron Intrastate AQCR (#123)

This region is a poor candidate for particulate emission regulation relaxation. Regional air quality indicators show widespread high particulate levels and the need for a substantial reduction in overall emissions in order to attain satisfactory air quality. The proposal of particulate AQMAs also indicates that the maintenance of acceptable air quality is expected to be difficult and that there should be no increase in particulate emissions. In addition, fuel combustion contributes a large portion of the total particulate loading meaning that any regulation relaxation would have a substantial effect on air quality.

The Federal Power Commission has designated the River Rouge and St. Clair power plants as having the potential to shift from oil to coal combustion. The indications of poor particulate air quality show that such a shift must be proceeded by a thorough study of its effects upon the region's particulate air quality.

Metropolitan Detroit-Port Huron is a poor candidate for SO_2 emission regulation relaxation. Although measured SO_2 levels are only slightly above the standards, indicating that, on a regional basis, there is no capacity to absorb increased SO_2 emissions, fuel combustion contributes a large fraction of the regional SO_2 emissions and hence any overall regulation relaxation would have a significant impact on air quality. However, there were no modeling results available for this study to indicate whether source specific relaxation might be possible and the magnitude of the indicated air quality problem is small. Wayne County is presently evaluating the need to implement the last step of its sulfur regulation and the situation there is thus already being studied. Outside Wayne County, the delayed compliance provision of the state regulation could be used for specific sources. SO_2 emissions from small area sources in Wayne County are regulated but those from that portion of this AQCR outside Wayne County are not. Thus, if available, higher sulfur

fuels could be utilized by some area sources in that portion of the region outside Wayne County.

3.5 Metropolitan Toledo Interstate AQCR (#124)

There is only one county in the Michigan portion of this AQCR. Newly installed units at the Monroe power plant, however, make this county a substantial coal user. Air quality data show high TSP levels and indicate little tolerance for increased emissions, making this region a poor candidate for particulate emission regulation relaxation.

SO_2 levels are apparently acceptable and there are indications of a regional capacity to absorb increased SO_2 emissions. The delayed compliance provision has already been used to allow the Monroe power plant to fire high sulfur coal and could be used for other fuel combustion sources in the region. Regulation revision would thus not be necessary to allow the use of high sulfur fuels through January 1, 1980, and the region is thus a poor candidate for SO_2 emission regulation relaxation. At the Whiting power plant, modeling by the state indicates that the continued use of 1% S coal is necessary. Some small area sources may be able to switch to higher sulfur fuels if they are available.

3.6 South Central Michigan Intrastate AQCR (#125)

South Central Michigan (#125) is a marginal candidate for particulate emission regulation relaxation. Although available indications are that the air quality is acceptable, measured levels are close to the standards and the regional ability to absorb increased particulate emissions is small. Since fuel combustion accounts for a large portion of the regional particulate emissions, regulation relaxation would have a substantial effect on the just acceptable air quality. Thus, any relaxation would require detailed study of its probable effects on air quality.

Although there are indications that more SO_2 air quality data is needed, there are high reported SO_2 levels suggesting little regional capacity to absorb increased SO_2 emissions. However, compliance extensions have been granted to several combustion sources in the region and this mechanism could be used for other sources if any further continued use of high sulfur fuels is possible. Thus, the regulations would not have to

be revised to allow the use of higher sulfur fuels through January 1, 1980. Under present regulations, small area sources could use higher sulfur fuels, if available.

3.7 Upper Michigan Interstate AQCR (#126)

Current particulate air quality data indicate that there are high particulate levels and no regional capacity to absorb increased particulate emissions in Upper Michigan (#126). Even though fuel combustion contributes a relatively small portion of the region's total particulate emissions, the indicated poor air quality makes this region a poor candidate for particulate emission regulation relaxation.

There are indications of acceptable SO_2 air quality. Although fuel combustion contributes a large fraction of the regional SO_2 load, the indicated regional tolerance for increased SO_2 emissions is large. The state has already granted compliance extensions to several fuel combustion sources in the region and is presently considering granting extensions to four more power plants. This mechanism could be used to allow the use of higher sulfur fuels through January 1, 1980 without regulation revision. Small area sources could use higher sulfur fuels.

APPENDIX A

State Implementation Plan Background

Table A-1. Michigan Air Pollution Control Areas

Air Quality Control Region	Federal Number	Demographic Information: Population 1970 (Millions)	Demographic Information: Area (Square Miles)	Demographic Information: Population Per Square Mile	Priority Classification: Particulates	Priority Classification: SO_x	Priority Classification: NO_x	Proposed AQMA Designations[a]: TSP Counties	Proposed AQMA Designations[a]: SO_x Counties
South Bend-Elkhart-Benton Harbor (Ind.)	82	.83	4,198	197	I	IA	III	(0)	(0)
Central Michigan	122	2.22	18,053	123	II	III	III	(0)	(0)
Metropolitan Detroit-Port Huron	123	4.33	2,686	1,613	I	I	III	(3) Macomb, Oakland, Wayne	(0)
Metropolitan Toledo (Ohio)	124	.69	1,519	457	I	I	III	(0)	(0)
South Central Michigan	125	1.40	7,873	178	II	II	III	(0)	(0)
Upper Michigan	126	.56	25,981	21	III	III	III	(0)	(0)

[a]As of November 14, 1974.

Figure A-1. Michigan Air Quality Maintenance Area (AQMA) Proposed Designations

Table A-2. Michigan Ambient Air Quality Standards

All concentrations in $\mu gm/m^3$

		Total Suspended Particulate		Sulfur Dioxide			Nitrogen Dioxide
		Annual	24-Hr	Annual	24-Hr	3-Hr	Annual
Federal and State	Primary	75(g)	260[a]	80(A)	365[a]	---	100(A)
	Secondary	60(G)	150[a]	---	---	1300[a]	100(A)

[a]Not to be exceeded more than once per year.

(A) Arithmetic mean

(G) Geometric mean

Table A-3. Michigan AQCR Air Quality Status, TSP[a]

AQCR No.	No. Stations Reporting		TSP Concentration ($\mu gm/m^3$)			Number of Stations Exceeding Ambient Air Quality Standards				% Reduction Required to Meet Standards[d]	Controlling Standard
			Highest Reading		2nd Highest Reading	Primary		Secondary			
	Annual	24-Hr	Annual	24-Hr	24-Hr	Annual	24-Hr[c]	Annual	24-Hr[c]		
82[b]	12	18	89	244	206	2	0	4	4	+ 54	Annual
122	35	41	137	783	743	3	1	11	9	+ 84	24-Hr
123	38	43	176	492	400	15	6	26	31	+ 82	Annual
124[b]	3	21	77	427	203	2	0	3	5	+ 40	Annual
125	8	12	58	191	136	0	0	0	0	- 8	Annual
126	13	18	60	1408	386	0	2	0	3	+ 67	24-Hr

[a] ...quality data in National Air Data Bank as of June 7, 1971.

[b] Interstate

[c] Violations based on 2nd highest reading at any station.

[d] Formula:

$$\left[\left(\frac{\text{2nd Highest 24-Hr - 24-Hr Secondary Standard}}{\text{2nd Highest 24-Hr - Background}}\right) \times 100, \left(\frac{\text{Annual - Annual Secondary Standard}}{\text{Annual - Background}}\right) \times 100\right]$$

Background TSP concentration: 35 $\mu gm/m^3$

Table A-4. Michigan AQCR Air Quality Status, SO_2[a]

AQCR No.	No. Stations Reporting		SO_2 Concentration ($\mu gm/m^3$)			Number of Stations Exceeding Ambient Air Quality Standards			% Reduction Required to Meet Standards[d]	Controlling Standard
			Highest Reading		2nd Highest Reading	Primary		Secondary		
	24-Hr	Cont.	Annual	24-Hr	24-Hr	Annual	24-Hr[c]	3-Hr[c]		
82[b]	5	0	14	382	259	0	0	0	- 41	24-Hr
122	11	5	22	1148	1148[e]	0	1	0	+ 68	24-Hr
123	9	16	82	410	147	1	0	0	+ 2	Annual
124[b]	3	6	41	224	82	0	0	0	- 95	Annual
125	2	2	82	756	756[e]	1	1	1	+ 51	24-Hr
126	4	0	19	122	64	0	0	–	- 470	24-Hr

[a] 1973 air quality data in National Air Data Bank as of June 7, 1974.

[b] Interstate

[c] Violations based on 2nd highest reading at any station.

[d] Formula:

$$\left[\left(\frac{\text{2nd Highest 24-Hr - 24-Hr Standard}}{\text{2nd Highest 24-Hr}}\right) \times 100,\ \left(\frac{\text{Annual - Annual Standard}}{\text{Annual}}\right) \times 100\right]$$

[e] Second highest reading not available at station with greatest excesses. First highest used as a conservative estimate. Station shows at least 8 violations of 24-Hr standard.

Table A-5. Michigan Fuel Combustion Source Summary

AQCR No.	Power Plants[a]	Other Fuel Combustion Point Sources[b]	Area Sources[c]	Total Emissions[d] (10^3 tons/year) TSP	SO_2	% Emissions from Michigan Fuel Combustion Sources TSP	SO_2
82[e]	0	1	3	72	87	5	7
122	7	10	29	196	573	66	99
123	13	10	4	378	815	76	92
124[e]	3	2	1	122	256	26	24
125	5	9	13	52	103	66	93
126	7	7	33	88	55	20	87
Total	35	39	83	908	1,889	55	81

[a]Michigan plants

[b]Michigan plants contributing 90% of the particulate and SO_2 emissions or 1000 tons/year.

[c]Michigan counties

[d]AQCR total

[e]Interstate

Table A-6. Michigan Emissions Summary[a], TSP

AQCR	Total (10^3 tons/yr)	%	Electricity Generation (10^3 tons/yr)	%	Industrial/Commercial/ Institutional Point Source (10^3 tons/yr)	%	Area Source (10^3 tons/yr)	%
82 Michigan	9	1	0	0	.3	4	3	39
Other	63	7	39	62	4	6	13	21
Total	72	8	39	54	4	5	16	23
122	196	22	32	16	74	38	24	12
123	378	41	68	18	186	49	33	9
124 Michigan	55	6	18	33	12	23	1	2
Other	67	7	4	6	14	21	16	24
Total	122	13	22	18	26	22	17	14
125	52	6	2	4	16	31	16	31
126	88	10	5	6	6	7	6	7
Total	908	100	168	19	312	34	112	12

[a]Emissions in Data Bank as of June 27, 1974

Table A-7. Michigan Emissions Summary[a], SO_2

AQCR	Total (10^3 tons/yr)	%	Electricity Generation (10^3 tons/yr)	%	Industrial/Commercial/ Institutional Point Source (10^3 tons/yr)	%	Area Source (10^3 tons/yr)	%
82 Michigan	7	1	0	0	1	10	5	74
Other	80	4	51	64	9	11	18	23
Total	87	5	51	59	10	11	23	27
122	573	30	307	54	217	38	40	7
123	815	43	621	76	70	9	54	7
124 Michigan	64	4	54	85	6	10	2	3
Other	192	10	79	41	55	29	13	7
Total	256	14	133	52	61	24	15	6
125	103	5	32	31	41	39	24	23
126	55	3	16	29	21	38	11	20
Total	1,889	100	1,160	61	420	22	167	9

[a]Emissions in Data Bank as of June 27, 1974

Table A-8. Michigan AQCR Required Emission Reduction[a]

AQCR	Required Particulate Emission Reduction		Required SO_2 Emission Reduction	
	%	10^3 tons/year	%	10^3 tons/year
82[b]	+ 54	+ 39	- 41	- 36
122	+ 84	+ 165	+ 68	+ 390
123	+ 82	+ 310	+ 2	+ 16
124[b]	+ 40	+ 49	- 95	- 243
125	- 8	- 4	+ 51	+ 53
126	+ 67	+ 59	- 470	- 259

[a]Based on a proportional change of emissions to air quality

[b]Interstate

Table A-9. Michigan Fuel Combustion Emission Regulations

		Existing Facilities			New Facilities
Visible Emissions	State[a]	Less than Ringelmann #1 or 20% opacity at all times except: (a) Smoke not darker than Ringelmann #2 or 40% opacity may be emitted for 3 min in any 60 min period but on not more than 3 occasions during any 24 hr period, (b) Where uncombined water vapor is the only reason for failure to comply, or (c) Where specifically permitted by the commission and all other requirements are being met.			Steam Generators > 250 x 10^6 Btu/hr Total Heat Input[b,c] Less than 20% opacity at all times except: (a) that 40% opacity is allowed for 2 min in any hr, or (b) where uncombined water vapor is the only reason for failure to comply.
	Wayne County	Less than Ringelmann #1.5 or 30% opacity at all times except: (a) For Ringelmann #1.5 or 30% opacity for 3 min in any 30 min period, (b) When uncombined water vapor is the only reason for failure to comply, or (c) For certain allowed open fires.			Less than 20% opacity at all times except: (a) that 40% opacity is allowed for 2 min in any hr, or (b) where uncombined water is the only reason for failure to comply.
Particulate Matter	State[a,d,e]		Capacity Rating (1,000 lb steam/hr)	Maximum Allowable Emission (lb particulate/ 1,000 lb exhaust gas)	0.10 lb/10^6 Btu total heat input[c]
		Pulverized coal (includes cyclone furnaces)	0 - 1,000	See Fig. A-2	
			> 1,000	Apply to Commission for limit.[f]	
		Other modes of firing	0 - 100	0.65	
			100 - 300	0.65 - 0.45[g]	
			> 300	Apply to Commission for limit.[f]	
	Wayne County[i]	Pulverized coal[h] (includes cyclone furnaces)	0 - 300	0.30 - 0.20[g]	0.10 lb/10^6 Btu total heat input[c]
			300 - 3,600	0.20 - 0.15[g]	
		All other modes of fuel firing	0 - 100	0.65	
			100 - 300	0.65 - 0.45[g]	
			300 - 800	0.45 - 0.30[g]	
			≥ 800	0.30	
SO_2	State[a,j,k]	Plant Capacity[l] (1,000 lb steam/hr)	Maximum % S in Fuel[b,n,o]		Solid Fuel: 1.2 lb/10^6 Btu total heat input[c] Liquid Fuel: 0.8 lb/10^6 Btu total heat input[c]
		0 - 500	1.5		For dual firing the emission factor is the average of those for solid and liquid fuels weighted by the % of the total heat input supply by each separately.[c]
		> 500	1.00		
		Burning fuel that results in an average emission of SO_2 for any calendar month at a rate greater than was emitted by the same equipment for the corresponding calendar month of the year 1970 is prohibited without authorization by the commission.			

Reproduced from best available copy.

Table A-9. Michigan Fuel Combustion Emission Regulations
(Contd.)

		Existing Facilities				New Facilities		
		Fuel Use by	Fuel	Maximum % S in Fuel[r]	Maximum ppm SO_2 in Exhaust Gas[d]	Steam Generators > 250 10^6 Btu/hr Total Heat Input[b,c]		
						Solid Fuel	Liquid Fuel	All Others
SO_2 (Contd.)		Electric power plants and central steam generation	Pulverized coal	1.00[s]	550	1.2 lb/10^6 Btu total heat input[c]	0.8 lb/10^6 Btu total heat input[c]	As in the ppm SO_2 in exhaust gas schedule for existing sources
			Other coal	0.50	280			
			Distillate oil (#1,2)	0.30	120			
			Other oil (#4,5,6)	0.70	280			
	Wayne County[p,q]	Residential/commercial space & water heating	Coal	0.30	120	For dual firing the emission factor is the average of those for solid and liquid fuels weighted by the % of the total heat input supplied by each separately.[c]		
			Distillate oil (#1,2)	0.30	120			
			Other oil (#4,5,6)	0.70	280			
		All other uses	Coal	0.50	280			
			Distillate oil (#1,2)	0.30	120			
			Other oil (#4,5,6)	0.70	280			
		All sources are limited to fuels having the same or lesser sulfur content on a comparable Btu basis than the same source used during the corresponding calendar month of the previous year. The year ending with July 31, 1971 is used as a base year.						

[a] Except Wayne County.

[b] Federal New Source Performance Standards apply for these sources.

[c] Total heat input from all fuels fired used to calculate allowable emission.

[d] Calculated to 50% excess air.

[e] Other maximum allowable emission rates can apply if specified by old installation or operating permits or by certain voluntary agreements, performance contracts, stipulations, or orders of the commission.

[f] Limit to be based on "best technically feasible, practical equipment available."

[g] Emission limitations for specific ratings are determined by linear interpolation between ranges shown.

[h] Any equipment of this type constructed after March 31, 1972 requires a maximum allowable emission listing from the Wayne County Dept. of Health.

[i] Corrected to 150% total air and deleting from the total exhaust gases that portion of water vapor added for collector or scrubber requirements.

[j] Applies to structures devoted to steam or electric generation only.

[k] Various exceptions to these limitations exist including a delayed compliance program which allows the use of higher S fuel until January 1, 1980. After January 1, 1980 specific authorization by the commission is the only permissible reason for non-compliance. (See footnote m.)

[l] Total steam production capacity of all coal and oil fired equipment.

[m] These limits are to be met on July 1, 1978. Less strict limits are to be met by July 1, 1975.

[n] Average sulfur content in all fuels burned at any one time calculated on basis of 12,000 Btu/lb for solid fuels and 18,000 Btu/lb for liquid fuels.

[o] The regulations are also expressed in terms of the equivalent ppm of SO_2 in the exhaust gases and in terms of the equivalent lb SO_2 emitted per 10^6 Btu of heat input for solid and liquid fuels assuming 12,000 Btu/lb for solid fuels and 18,000 Btu/lb for liquid fuels.

[p] Applies to all fuel combustion including space and water heating.

[q] Certain exceptions exist for persons operating stack gas desulfurization equipment.

[r] Persons using a combination of fuels to meet the SO_2 in exhaust gas schedule are exempt from this provision upon approval by the division. The allowable emission is based on the value of the schedule for the fuel having the higher allowable limit.

[s] A less strict limit is applicable on August 1, 1975.

Reproduced from best available copy.

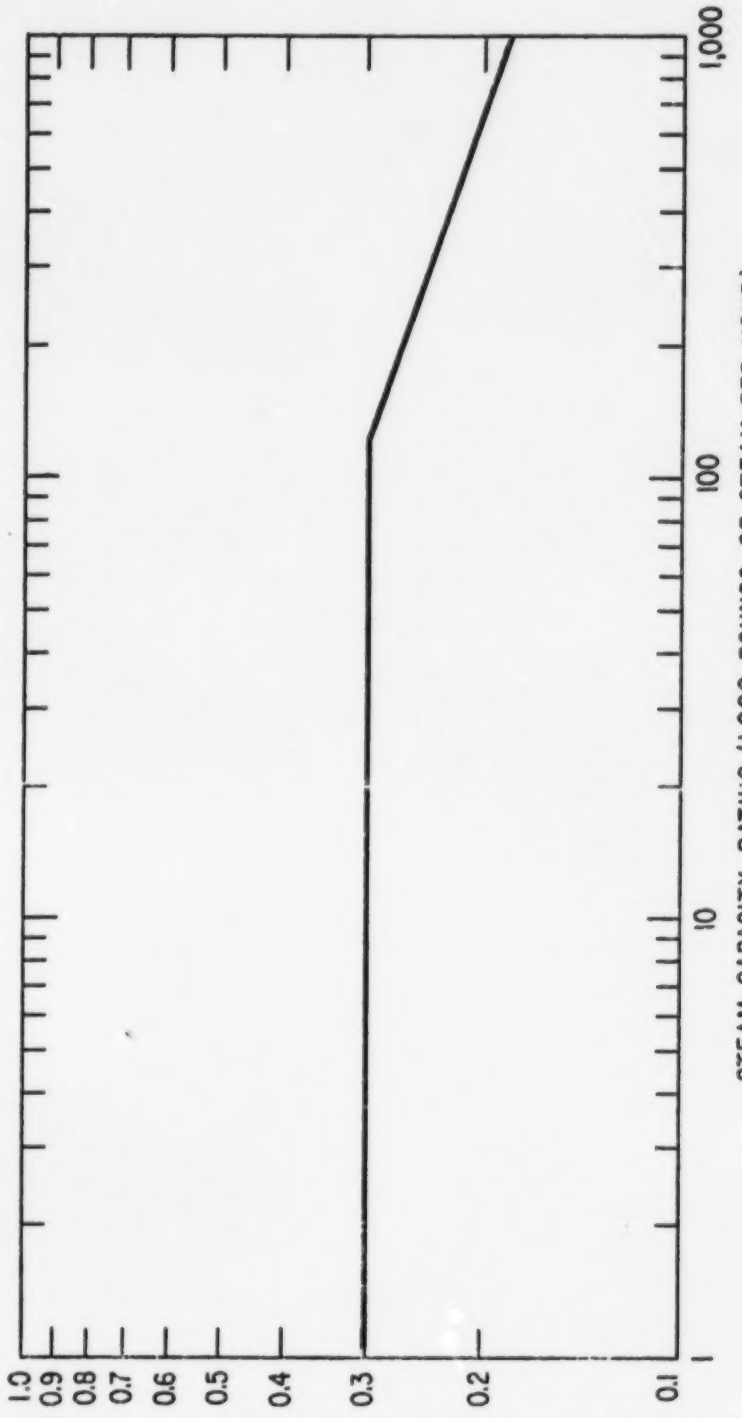

Figure A-2. Allowable Particulate Emissions from Michigan Pulverized Coal Fuel Burning Equipment Outside Wayne County.

APPENDIX B

Regional Air Quality Assessment

Table B-1. Michigan AQCR Candidacy Assessment for Particulate Regulation Relaxation

Air Quality Control Region	Federal Number	Stations with Particulate Air Quality Violations	Expected Attainment Date	Number of Counties with Proposed AQMA Designations	Total Particulate Emissions (10^3 tons/yr)	% Emissions from Michigan Fuel Combustion	Emission Reduction Required for NAAQS (10^3 tons/yr)	Particulate Priority
South Bend-Elkhart-Benton Harbor (Ind.)	82	4	7/75	0	72	5	+ 39	I
Central Michigan	122	13	7/75	0	196	66	+ 165	II
Metropolitan Detroit-Port Huron	123	32	7/75	3	378	76	+ 310	I
Metropolitan Toledo (Ohio)	124	6	7/75	0	122	26	+ 49	I
South Central Michigan	125	0	—	0	52	66	- 4	II
Upper Michigan	126	3	—[a]	0	83	20	+ 59	III

[a]Attainment schedule indicates region is below standards; current data indicates violations.

Table B-2. Michigan AQCR Candidacy Assessment for SO_2 Regulation Relaxation

Air Quality Control Region	Federal Number	Stations with SO_2 Air Quality Violations	Expected Attainment Date	Number of Counties with Proposed AQMA Designations	Total SO_2 Emissions (10^3 tons/yr)	% Emissions from Michigan Fuel Combustion	Emission Reduction Required for NAAQS (10^3 tons/yr)	SO_2 Priority
South Bend-Elkhart-Benton Harbor (Ind.)	82	0	–	0	87	7	- 36	IA
Central Michigan	122	1	7/75	0	573	99	+ 390	III
Metropolitan Detroit-Port Huron	123	1	7/75	0	815	92	+ 16	I
Metropolitan Toledo (Ohio)	124	0	–	0	256	24	- 243	I
South Central Michigan	125	1	7/75	0	103	93	+ 53	II
Upper Michigan	126	0	–	0	55	87	- 259	III

APPENDIX C
Power Plant Assessment

Table C-1. Michigan Power Plant Assessment

AQCR	Plant	1975 Capacity (Mw)	Estimated 1975 Fuel Use		% S Under SIP Regulations[b]	% S Allowed by Model[c]
			Fuel	Quantity[a]		
82[d]	No plants					
122	J. H. Campbell	650.0	coal	1,341	3.3[o]	3.3
			oil	727	0.3	0.3
	D. E. Karn[e]	1,767.0	coal	1,427	3.2[o]	3.2
			oil	14,341	0.2[f]	0.2[f]
	B. C. Cobb	510.5	coal	1,534	3.3[o]	3.3
			oil	554	0.5	0.5
	J. C. Weadock	614.5	coal	1,452	2.8[o]	2.8
			oil	5,208	0.3	0.3
	J. deYoung	77.3	coal	259	2.8[o]	2.8
			gas	65	–	–
	Harbor Island	20.0	coal	70	2.6[o]	2.6
	Harbor Beach	121.0	coal	266	2.9[o]	2.9
			oil	1,692	0.4	0.4
123	Conners Creek	540.0	coal	950	0.75[g]	–
			oil	15,596	0.3	–
			gas	6,788	–	–
	Delray[h]	375.0	oil	148,677	0.7	–
			gas[i]	11,618	–	–
	Marysville[h]	230.0	coal	750	1.0	–
			gas	217	–	–
	Pennsalt[h]	37.0	coal	162	0.9	–
			oil	354	0.3	–
	River Rouge[h]	933.2	coal	1,842	1.0	–
			oil	36,779	0.7	–
			gas[i]	17,158	–	–
	St. Clair	1,905.00	coal	4,788	1.0	–
			oil[j]	24,710	1.1	–
			gas	139	–	–
	Trenton Channel[h]	1,075.5	coal	2,253	1.0	–
			oil	12,306	0.3	–
			gas	18,824	–	–
	Wyandotte No.[h]	54.1	coal	321	0.8	–
			oil	3,911	0.3	–
			gas	1,238	–	–

Table C-1. Michigan Power Plant Assessment (Contd.)

AQCR		1975 Capacity (Mw)	Estimated 1975 Fuel Use		% S Under SIP Regulations[b]	% S Allowed by Model[c]
			Fuel	Quantity[a]		
123 (Contd.)	Mistersky	174.0	coal	324	1.0	–
	Beacon St.	23.0	coal	17	0.5	–
	Port Huron[h]	6.3	coal	5	1.5	–
	Wyandotte So.[h]	18.5	coal	14	1.0	–
	Wyandotte	40.0	gas	3,342[k]	–	–
124[d]	J. R. Whiting	325.0	coal	984	1.5	1.0[p]
			oil	65	0.5	0.5
	Enrico Fermi	158.0	oil	45,128	0.4	–
	Monroe[l]	3,075.2	coal	8,076	2.9[o]	3.0
			oil	3,945	0.4	0.4
125	B. E. Morrow	186.0	oil	26,187	1.0	–
			gas	8,492	–	–
	O. E. Eckert[s]	386.0	coal	671	1.5	2.1
	Ottawa St.	81.5	coal	102	2.8[o]	2.8
	Erickson 1[m]	160.0	coal	665	2.8[o]	2.8
	Coldwater	11.1	coal	37	1.5	–
126	Advance	36.0	coal	129	1.5[r]	–
			oil	84	0.3	–
	Presque Isle[n]	344.7	coal	900	1.3[o]	1.3
			oil	823	0.1	–
	Escanaba	23.0	coal	80	1.5[r]	–
	J. H. Warden[h]	18.8	coal	49	1.5[r]	–
			gas	731	–	–
	Gladstone	6.0	coal	12	1.5[r]	–
	Bayside Station	35.0	coal	55	1.5	–
			gas	321	–	–
	Shiras	34.5	coal	74[q]	3.4[o]	3.4
			gas	312[q]	–	–

Table C-1. Michigan Power Plant Assessment (Contd.)

Footnotes

[a]Fuel requirements based on 1971 fuel use patterns at 1975 consumption rates. If 1971 fuel use data were unavailable, 1972 data were used. Coal in 10^3 tons/yr, oil in 10^3 gal/yr, gas in 10^6 ft^3/yr.

[b]The maximum allowable % S is the 1971 % S unless regulations require a lower % S. Final compliance regulations to be met by July 1, 1978 outside Wayne County and by August 1, 1976 inside Wayne County were assumed to apply in 1975.

[c]Maximum allowable coal % S is 1971 % S unless modeling indicates a lower % S. Oil % S is SIP % S. At plants where delayed compliance plans exist (see footnote o), the coal % S is that specified in the contract or agreement with the commission.

[d]Interstate.

[e]New units in 1974 and 1975.

[f]Projected oil % S content will be below SIP requirements; therefore, the projected oil % S was used and reported as SIP.

[g]Assuming steam production equally split between pulverized coal and stoker units.

[h]Figures include some fuel used for purposes other than electrical generation.

[i]Includes blast gas and natural gas.

[j]Also fired light oil.

[k]Actual figure unavailable. Estimated on basis of heat input at other power plants of similar capacity.

[l]New units in 1973 and 1974.

[m]New plant in 1973.

[n]New unit in 1974.

[o]High sulfur coal being burned until January 1, 1980 as allowed by special contract or agreement with the commission under the delayed compliance provisions of the SO_2 emission regulations.

[p]Recent modeling by the state indicates that 1.0% S coal may be necessary at the Whiting Plant.

[q]1974 consumption figures.

[r]Michigan is presently considering allowing these plants to burn higher sulfur coals under the delayed compliance provision: at advance 2.4% S, at Escanaba 1.7% S, at Warden 1.9% S, and at Gladstone 3.1% S.

[s]Commission presently has agreement requiring low S fuel. Plant is now considering Supplementary Control System.

Table C-2. Michigan Power Plant Evaluation Summary

AQCR	Fuel	1975 Fuel Required by SIP Regulations[a,c] < 1%	1-2%	> 2%	1975 Fuel Required by Modified Regulations[b,c] < 1%	1-2%	> 2%
82[d]	No plants						
122	coal			6,349			6,349
	oil	22,522			22,522		
	gas	65			65		
123	coal	1,450	9,976		No modeling results		
	oil	217,623	24,710				
	gas	59,324					
124[d]	coal		984	8,076		984	8,076[e]
	oil	49,138			49,138		
125	coal		708	767			1,438[f]
	oil		26,187			26,187	
	gas	8,492			8,492		
126	coal		1,225	74		900[f]	74[f]
	oil	907			907		
	gas	1,364			1,364		
Michigan Total	coal	1,450	12,893	15,266		1,884	15,937
	oil	290,190	50,897		72,567	26,187	
	gas	69,245			9,921		

Table C-2. Michigan Power Plant Evaluation Summary (Contd.)

Footnotes

[a]Fuel requirements based on 1971 fuel use patterns at 1975 consumption rates. If 1971 fuel use data were unavailable, 1972 data were used. Coal in 10^3 tons/yr; oil in 10^3 gal/yr; gas in 10^6 ft^3/yr. Maximum allowable % S is 1971 % S unless regulations require a lower % S. Final compliance regulations were assumed to apply in 1975.

[b]Maximum allowable coal % S is 1971 % S unless modeling indicates a lower % S. Oil % S is SIP % S.

[c]At plants where delayed compliance plans exist (see Table C-1), the coal % S is that which is specified in the contract or agreement with the commission.

[d]Interstate.

[e]Modeling results for 96% of 1975 capacity.

[f]Modeling results for 76% of 1975 capacity.

APPENDIX D

Industrial, Commercial, Institutional Point Source Assessment

Table D-1. Michigan Industrial/Commercial/Institutional Source Assessment

AQCR	Plant[a]	Fuel[b]	Estimated Fuel Consumption[c]	SIP Regulations %S[d]
82[e]	Watervliet Paper	Coal	25	1.5
122	GMC - Buick Motor Div.[g]	Coal	256	1.0
	Dow Chemical	Coal	1,234	1.0
	Hooker Chemical	Coal	109	1.5
	S. D. Warren Company	Coal	168	1.7[f]
	Michigan Sugar	Coal	42	1.5
	Monitor Sugar	Coal	40	1.0
	Michigan Sugar-Croswell	Coal	24	1.5
	Saginaw Steering Gear	Coal	61	1.0
		Oil	7,760	1.0
	Michigan Sugar-Caro	Coal	21	1.0
	Menasha Corporation	Coal	29	1.5
123	Allied Chemical	Coal	548	1.0
	Ford Motor	Coal	588	1.0
		Gas	9,060	---
	Mueller Brass	Coal	88	1.5
	Chrysler-Dodge Truck Assembly	Coal	44	1.5
	General Motors	Coal	66	0.50
	Chrysler-Sterling Stamping Plant	Coal	20	1.5
	LTV Aerospace	Coal	21	1.5
	Fisher Body	Coal	164	1.0
	Kelsey-Hayes	Coal	24	0.50
	Mobil Oil	Oil	13,820	0.70
		Gas	466	----

Table D-1. Michigan Industrial/Commercial/Institutional Source Assessment (Contd.)

AQCR	Plant[a]	Fuel[b]	Estimated Fuel Consumption[c]	SIP Regulations %S[d]
124[e]	Ford Motor	Coal	30	1.5
	Union Camp	Coal Gas	126 8,740	2.6[f,h] ---
125	Kalamazoo State Hospital	Coal	164	1.5
	Weyerhauser	Coal	154	1.5
	National Gypsum	Coal	44	1.5
	Simpson Lee Paper	Coal	32	1.5
	Hercules	Coal	121	1.5
	Fisher Body	Coal	68	1.5
	Coldwater State Home and Training School	Coal	24	1.5
	Upjohn Company	Coal	55	1.0
	Michigan State University	Oil Gas	30,400 518	1.0 ---
126	Escanaba Paper	Coal Gas	78 5,240	1.0 ---
	Hoerner Waldorf	Coal	60	1.5
	White Pine Copper	Coal	330	1.5
	Morton Salt	Coal	54	1.5[i]
	American Can	Coal	56	1.5
	Packing Corporation of America	Coal	56	1.5
	Abitibi Corporation	Coal	82	1.5

Table D-1. Michigan Industrial/Commercial/Institutional Source Assessment (Contd.)

Footnotes

[a]Michigan plants contributing 90% of the AQCR's SO_2 or particulate emissions or 1,000 or more tons/yr.

[b]Does not include plant or process gas.

[c]Coal in 10^3 tons/yr; oil in 10^3 gals/yr; gas in 10^6 ft^3/yr.

[d]Since unit-by-unit fuel mix data were unavailable, compliance was required on a plant-wide basis. Corrected to 12,000 Btu/lb for solid fuels and 18,000 Btu/lb for liquid fuels. Final compliance regulations to be met by July 1, 1978 in Michigan outside Wayne County and by August 1, 1976 in Wayne County were assumed to apply in 1975. At plants where delayed compliance plans exist (see footnote f), the coal % S is that specified in the contract or agreement with the commission.

[e]Interstate.

[f]High sulfur coal being burned until January 1, 1980 by special contract or agreement with the commission under the delayed compliance provisions of the SO_2 emission regulations.

[g]Currently under review for possible switching to higher sulfur fuel under delayed compliance provision.

[h]Currently under review. May need to use lower sulfur coal.

[i]Michigan is presently considering allowing this plant to burn 3.0% S coal under the delayed compliance provision.

Table D-2. Michigan Industrial/Commercial/Institutional Source Evaluation Summary

AQCR	Fuel	Fuel Required by Existing Regulations[a] <1%	1-2%	>2%
82[b]	Coal		25	
122	Coal		1,984	
	Oil	7,760		
123	Coal	90	1,473	
	Oil	13,820		
	Gas	9,526		
124[b]	Coal		30	126
	Gas	8,740		
125	Coal		662	
	Oil		30,400	
	Gas	518		
126	Coal		716	
	Gas	5,240		
Michigan Total	Coal	90	4,890	126
	Oil	21,580	30,400	
	Gas	24,024		

[a]Does not include plant or process gas.
Coal in 10^3 tons/yr; oil in 10^3 gals/yr; gas in 10^6 ft^3/yr.
Percent S in fuel as fired, not corrected to standard Btu/lb values, and assuming current heating values. Final compliance regulations to be met by July 1, 1978 in Michigan outside Wayne County and by August 1, 1976 in Wayne County were assumed to apply in 1975.

[b]Interstate.

APPENDIX E

Area Source Assessment

Table E-1. Michigan Area Source Fuel Use

AQCR	Coal (10^3 tons/yr)	Residual Oil (10^3 gals/yr)	Distillate Oil (10^3 gals/yr)	Natural Gas (10^6 ft^3 yr)
82[a]	118	9,710	175,910	75,620
122	493	74,120	622,240	131,920
123	567	40,700	936,650	441,060
124[a]	245	1,670	101,850	58,450
125	376	31,190	393,210	106,510
126	112	8,990	233,620	22,850
Total	1,911	166,380	2,463,480	836,410

[a]Interstate - Fuel use figures are for entire AQCR.

APPENDIX F

Fuels Assessment

Table F-1. Michigan Clean Fuels Analysis Summary

AQCR	Fuel	Existing Regulations Clean Fuel Requirements[a] < 1% S	1-2% S	> 2% S	Minimum Clean Fuel Savings Through Regulation Modification[b] < 1% S	1-2% S
82[c]	coal		25		No power plants.	
122	coal		1,984	6,349	0	0
	oil	30,282			-----	------
	gas	65			-----	------
123	coal	1,540	11,449		No modeling results.	
	oil	231,443	2[illegible],710			
	gas	68,850				
124[c]	coal		1,014	8,202	0	0
	oil	49,138			-----	------
	gas	8,740			-----	------
125	coal		1,370	767	0	671[d]
	oil		56,587		-----	------
	gas	9,010			-----	------
[illegible]	coal		1,9[illegible]	74	0	0
	oil	907			-----	-----
	gas	6,604			-----	-----
Michigan Total	coal	1,540	17,783	15,392	0	671[d]
	oil	311,770	81,297		-----	-----
	gas	93,269			-----	-----

[a]Includes fuel use from power plants (Table C-1) and industrial/commercial/institutional point sources (Table D-1) only. Coal in 10^3 tons/yr; oil in 10^3 gal/yr; gas in 10^6 ft^3/yr. Final compliance regulations to be met by July 1, 1978 in Michigan outside Wayne County and by August 1, 1976 in Wayne County were assumed to apply in 1975.

[b]Based on modeling results for coal at power plants only. Includes potential savings that could be realized by present delayed compliance provisions.

[c]Interstate.

[d]This reflects coal consumption at the Eckert power plant which has an agreement with the Commission to burn low S coal but is currently considering a Supplementary Control System.

REFERENCES

1. Modeling Analysis of Power Plants for Compliance Extensions in 51 Air Quality Control Regions, report prepared under Contract No. 68-02-0049 for the U.S. Environmental Protection Agency, Walden Research Division of Abcor, Inc., Cambridge, Mass., December 17, 1973.

2. Steam Electric Plant Factors, 1973, National Coal Association, Washington, D.C., January 1974.

3. Power plant data file, unpublished, U.S. Environmental Protection Agency, Research Triangle Park, N.C.

4. Power plant SO_2 emission estimates, unpublished data, U.S. Environmental Protection Agency, Research Triangle Park, N.C.

5. National Emissions Data Systems data bank, U.S. Environmental Protection Agency, Research Triangle Park, N.C.

6. Federal Energy Administration, unpublished data.